

Study on the influence of learning gains on the learning satisfaction in public PE courses—Taking learning conditions as the regulatory variable

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Keywords: Learning condition; learning harvest; learning satisfaction; structural equation model

Abstract: The structural equation model of learning satisfaction is established. Through the fitting analysis of the model, it is found that the adjustment effect of the learning condition exists. Under the same learning harvest, the better the learning conditions, the better the students' satisfaction with the physical education courses. Learning conditions will not only affect the effect of physical education exercise, but also have a significant impact on the degree of students' inner love for physical education courses. On the basis of the specific index analysis, five suggestions are put forward, such as strengthening the construction of school sports venues and the rich physical exercise atmosphere, and improving the teaching conditions of public physical education courses.

1. Introduction

Public physical education course is one of the important courses in talent training in Chinese universities, and an important means to cultivate talents with "moral, intellectual, physical, beauty and labor". The evaluation of physical education course has always been the focus of researchers in the field of physical education teaching. Learning satisfaction refers to the satisfaction of students based on teaching quality such as learning process, environment and harvest. In recent years, scholars at home and abroad to introduce the American customer satisfaction model (ACSM) course teaching evaluation, through the questionnaire, to quantify students learning satisfaction to course satisfaction measurement, and build some learning influence factors based on learning satisfaction model, promote the scientific development of curriculum evaluation system in our country. Compared with the study of learning satisfaction in the course evaluation, scholars have studied the harvest of learning even further. Learning harvest is the main index that reflects students' output in the learning process, and also the main reflection of the teaching effect. From the perspective of the goal of education, college students need to participate in the development and progress in all aspects through participating in the teaching process. According to Bloom's educational objectives, this development and progress is mainly reflected in the field of knowledge, action skills and emotional field, which is also the theoretical cornerstone of the satisfaction

evaluation of college students [1]. It can be said that learning harvest for students is like consumption harvest for customers, is the main index affecting satisfaction. However, satisfaction as a subjective evaluation, learning harvest is how in affect the learning satisfaction, which factors will interfere with learning harvest on learning satisfaction, understand these problems, we can more deeply to find the rule of learning experience, so as to better build sports course evaluation system based on learning satisfaction.

2. The presentation of the question

The literature data of 2001-2020 from 276 core journals focusing on "learning gain" or "learning satisfaction" were visually analyzed by citespace visualization software. In terms of authors and institutions, there are Jiang Zhihui and Zhao Chengling teams from Central China Normal University, who mainly study the satisfaction of learners of online courses. They believe that "teachers' professional knowledge is the basis for improving learners' satisfaction" and "online learning platform is the key to ensuring learners' satisfaction"[2]. The Wenjing and Xue Dong teams of Xiamen University mainly constructed and improved the learning satisfaction model of college students, studied the improvement path and optimization strategy of their learning satisfaction, and discussed the important role of their learning satisfaction in the evaluation of higher education quality. Guo Hui and Han Ting teams of Huazhong University of Science and Technology studied the harvest of scientific research and believed that "the investment of college students has a significant influence on the learning harvest"[3]. Wang Yeng of Nanjing University conducted a study on the learning satisfaction of different groups of students such as high-level universities and vocational colleges, and believed that there are differences in colleges, majors and grades in the satisfaction of high-level universities and colleges [4]. Li Xiongying and Huang Dong'an have conducted in-depth research on this field.

From the perspective of keywords analysis, in addition to learning satisfaction and learning gain, keywords that occur more than 5 times from high to low frequency are influencing factors (26), college students (21), flipped classroom (12), learning input (10), structural equation model (9), students (8), mooc (8), educational gain (6) and learning effect (5). It can be seen that current studies on learning gain and learning satisfaction are dominant influencing factors, and the study samples are mostly college students. Besides, there are also many researches on learning gains and satisfaction of online learning flipped classroom and MOOCs, and structural equation model [SEM] is a commonly used tool for scholars.

Scholars from the teaching methods, learning input, learning conditions of learning satisfaction, learning harvest influence factors, study the influence of learning harvest on learning satisfaction literature is less, especially in the previous research the learning conditions on school satisfaction as a dependent variable or intermediary variable, few learning conditions as a learning harvest on learning satisfaction interference variables. Moreover, few studies on learning satisfaction in PE courses are conducted especially with the method of structural equation model. On the basis of previous research, the study in the predecessors build learning satisfaction model, on the basis of build a learning harvest on learning satisfaction structure equation model, and demonstrate the learning conditions on learning harvest and learning satisfaction of regulatory utility exist, so as to provide reference for subsequent find more regulatory utility.

3. Study Samples and Study design

3.1. Study Samples

In this study, 214 undergraduate students from 2 universities in Chongqing were randomly

investigated by questionnaire after the physical education course of last semester, including 120 male students and 94 female students.

3.2. Study design

On the basis of the scale developed by predecessors, the main part of the questionnaire designed in this study investigated college students' feelings in 11 aspects of learning public physical education courses from three dimensions. Learning satisfaction was measured from five aspects: teaching method, learning process, curriculum experience, curriculum evaluation and teacher evaluation; learning conditions were measured from three aspects: site facility conditions, site management level and site exercise atmosphere; learning gains were measured from three aspects: course goal achievement, physical fitness and athletic skill improvement. The questionnaire was measured by RobertK. Merton's 5-point scale. Exploratory factor analysis was carried out on the preliminary data of the questionnaire survey to verify and improve the research design structure. Confirmatory factor analysis was carried out on the basis of exploratory factor analysis to fit the structural equation model of learning satisfaction constructed. Finally, combined with professional theoretical knowledge, the data of model operation was discussed and analyzed.

4. Exploratory factor analysis

4.1. Validity test

Exploratory factor analysis was carried out on the data collected by the questionnaire. Principal component method and maximum variance method were used for factor rotation, and three cofactors were extracted. There were three indicators related to learning conditions: site management, site conditions and sports atmosphere. There are three things related to learning gains: the realization of learning goals, the improvement of motor skills, and the improvement of physical quality; there are five indexes related to learning satisfaction: course satisfaction, achievement satisfaction, teacher satisfaction, teaching method satisfaction and learning process satisfaction. KMO and Bartlett test results are shown in Table 1: KMO value =0.859, the standard load extracted for each common factor is greater than 0.6, and the cumulative contribution rate of the extracted common factor reaches 67.7%, indicating that the three cofactors have good representation and the validity of the questionnaire is relatively good.

Table 1: KMO and Bartlett tests

Sample a sufficient Kaiser-Meyer-Olkin metric.		.859
The sphericity test of the Bartlett	Approximate chi square	728.770
	df	55
	Sig.	.000

4.2. The reliability test

First, the data of 140 questionnaires collected in the early stage were collated and reliability analyzed. The test results of reliability and validity are shown in Table 2: The clonal Bach coefficient (Cronbach's Alpha) of learning satisfaction, learning condition and learning harvest was 0.844, 0.852 and 0.703, respectively. The Cronbach's Alpha value of the overall questionnaire was 0.870. According to Nunnally (1978), the Cranbach's a coefficient in general exploratory studies was above 0.6, which was considered to have high credibility [5]. It can be seen that both the overall questionnaire and the three dimensions of the questionnaire have a relatively high reliability,

that is, the higher reliability of the questionnaire.

Table 2: Credit and validity test data sheet

factor	Measure item	gauge load	CR	AVE	Cronbach's α
Learning satisfaction (XXMYD)	XXMYD_JS	.826	.850	.532	.844
	XXMYD_GC	.755			
	XXMYD_KC	.692			
	XXMYD_PJ	.688			
	XXMYD_FF	.675			
learning conditions (XXTJ)	XXTJ_GL	.892	.885	.722	.852
	XXTJ_CD	.891			
	XXTJ_FW	.758			
learning gain (XXSH)	XXSH_SZ	.783	.769	.527	.703
	XXSH_JN	.740			
	XXSH_MB	.648			

5. Validatory factor analysis

Based on the exploratory factor analysis, a learning satisfaction model was constructed. The harvest of physical education course learning refers to the development and progress of students in sports theoretical knowledge, sports skills and emotion after participating in the learning process. Model hypothesis H1: Learning harvest has a positive impact on learning satisfaction, namely when learning satisfaction increases; hypothesis H2: Learning conditions have a positive effect on learning harvest. Robert Pace (Robert Pace) conducts research from the perspective of student investment, focusing on the time and effort invested by students, coupled with the use of school facilities and opportunities, which affects the learning harvest [6]. It can be seen that learning condition affects learning harvest; model hypothesis H3: Learning condition positively affects learning satisfaction. Many previous studies have also proved that the learning condition is the influence factor of learning satisfaction. Therefore, according to the H2 and H3 assumed by the comprehensive model, the learning condition is the adjustment variable that learning gain affects learning satisfaction, that is, the learning condition will change the linear slope between learning gain and learning satisfaction.

5.1. Test of the regulatory effect

Whether the regulatory effect of the learning condition exists directly affects whether the model hypothesis holds. Strmental regression was used to test the regulatory effect. The 214 data collected were collated using SPSS20.0, excluding 17 invalid questionnaires and 197 remaining data. First, the average data of the three dimensions are calculated, and three data of learning harvest (XXSH), learning condition (XXTJ) and learning satisfaction (XXMYD) are obtained. Then, the three data are standardized to obtain XXXSH, XXXTJ and ZXXMYD3 data. The average value of XXXSH and ZXXXTJ is AZXXSH and AZXXTJ, and the adjustment variable "learning harvest is calculated. Value of learning condition " = $(ZXXSH - AZXXSH) * (ZXXTJ - AZXXTJ)$ to obtain XXTJ. XXSH data. The hierarchical regression analysis was used to test whether the regulation effect existed, with the main effect XXSH and XXTJ included in the first step, and the regulation effect XXSH included in the second step.XXTJ.Two models were obtained, The test results of adjustment effect are shown in Table 3: P=0.000 for "learning harvest" and P=0.002 in Model 1, indicating that the effect of "learning condition" and "learning harvest" on "learning satisfaction"

was significant, and the main effect existed. Regulatory effect in Model 2 "Learning condition. Learning harvest "P=0.043 <0.05, indicating the existence of regulatory effects of the" learning condition" assumed by the model.

Table 3: The detection coefficient of the regulatory effects

model		Non-standardized coefficients		Standard coefficient	t	Sig.
		B	standard error	trial version		
1	(constant)	1.551	.192		8.094	.000
	XXSH	.580	.053	.613	10.887	.000
	XXTJ	.133	.043	.173	3.066	.002
2	(constant)	1.588	.191		8.316	.000
	XXSH	.567	.053	.599	10.643	.000
	XXTJ	.143	.043	.185	3.295	.001
	XXTJ.XXSH	-.055	.027	-.104	-2.037	.043

5.2. Model fittingcond Section

On the basis of the proven regulatory effect, the study further fitted the model with a confirmatory factor analysis using AMOS23.0. Test results were obtained: CMIN / DF value =1.913 <3, model fit index value GFI=0.935> 0.9, AGFI=0.895 close to 0.9, RMR = 0.031 <0.05, and RMSEA = 0.069 <0.08. The p-value =0.000, although highly significant, but the disadvantage of this indicator is susceptible to the sample size, so it is acceptable[7]; Overall, the structural equation model of learning satisfaction constructed in this study fits well to the actual observed data. The final model and model fitting structure are shown in Figure 1.

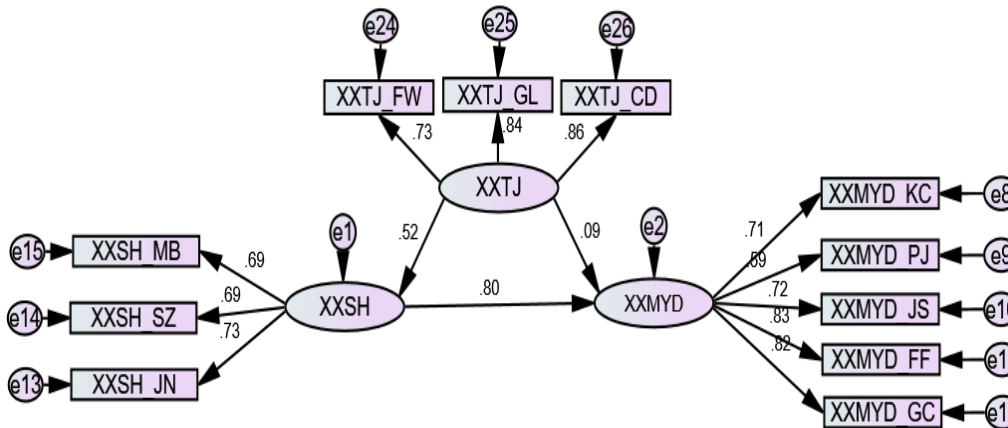


Figure 1: Structural equation model for the effect of learning gains on learning satisfaction

6. Conclusion and recommendations

The validity and reliability of the questionnaire showed good validity and reliability. Exploratory factor analysis extracted three common factors, which agreed with the questionnaire design. The validation factor analysis data indicators are good, indicating that the learning satisfaction model fits well with the actual survey data. Through the model construction and the analysis of the data, the present study has reached the following conclusions:

6.1. Conclusion

The regulatory effects of the learning conditions exist. That is, under the same learning harvest, the better the learning conditions, the better the students' satisfaction with the physical education courses. It shows that the learning conditions of physical education courses are very important to the students' inner experience of learning. Learning conditions will not only affect the effect of physical education exercise, but also have a significant impact on the degree of students' inner love for physical education courses.

Among the five indicators that affect learning satisfaction, the influence degree changed from strong to weak: course evaluation (XXMYD _ PJ, 0.89), teaching method (XXMYD _ FF, 0.83), teaching process (XXMYD _ GC, 0.82), teacher (XXMYD _ JS, 0.72), and course (XXMYD _ KC, 0.71). Among them, the factor load of the three indexes of course evaluation, teaching method and teaching process all exceeded 0.8, and students showed strong satisfaction in these three aspects, namely, high satisfaction with the examination results of physical education courses, the teaching method of physical education teachers and the learning process. In particular, the satisfaction is the highest, which reflects to some extent that the examination results of students in public PE courses are generally ideal.

In learning the strength of the three indicators of harvest, in turn for the goal to achieve (XXSH _ MB, 0.69), physical quality (XXSH _ SZ, 0.69) and sports skills (XXSH _ JN, 0.73), is the biggest influence on learning harvest sports skills, this is because the university sports public course generally adopt independent course mode teaching, course teaching content is mainly in sports skills teaching. In addition, students have expectations in learning motor skills when choosing courses. If chose a tennis course to learn, also want to learn the technical movements of tennis, so, learning the harvest in the sports skills reflect the most obvious. At the same time, as a study of physical education courses, students also expect to improve their physical quality, will exercise and other aspects.

Influence the teaching conditions on the three indicators of influence degree in order for the site (XXTJ _ CD, 0.86), site management (XXTJ _ GL, 0.84) and exercise atmosphere (XXTJ _ FW, 0.73), visible, the quality of physical education learning conditions is first reflected on the hardware, followed by the site management, exercise atmosphere and other software conditions, hardware first to keep up with, hardware condition is basic, hardware, students will be more active participation in exercise, exercise atmosphere to better. Therefore, the hardware is also an important factor affecting the software.

6.2. Suggestions

The first suggestion is to strengthen the construction of school sports venues and strong physical exercise atmosphere, improve the teaching conditions of public physical education courses; the second suggestion is to improve the teaching quality of public physical education courses and enhance the level of sports skills of college students. The third suggestion is to improve the learning experience of college students and enhance their satisfaction in learning public physical education courses. The fourth suggestion is to not only pay attention to the evaluation of teaching methods and teaching process indicators, but also avoid the influence of the evaluation of students' learning satisfaction under different site conditions, so as to ensure the fairness of the evaluation of teachers in different projects. The fifth suggestion is to further explore the factors affecting learning satisfaction and promote the scientific development of teaching evaluation on the basis of this study.

Acknowledgement

Fund Project: 2020 Chongqing Higher Education Teaching Reform Research Project, Project No.: 203342.

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